VASQUEZ BOULEVARD / INTERSTATE 70 (VB/I-70) SITE

TECHNICAL MEETING OF THE WORKING GROUP ON RESIDENTIAL SOIL SAMPLING DESIGN

WEDNESDAY MAY 19, 1999
PROPOSED DISCUSSION

MEETING OBJECTIVES: EPA is seeking input from technical working group members on the design of a residential soil sampling study to be implemented in July, 1999.

BACKGROUND: The last meeting of the full VB/I-70 working group was held on May 6, 1999. At that meeting, two aspects of the residential soil sampling design were identified as requiring further in depth technical discussion; the basis for the number of samples to be collected in each yard and the need for sampling below a depth of 2". This meeting was scheduled to provide a forum for such a discussion.

The residential soil sampling study will be designed to collect sufficient data to characterize exposure pathways associated with off-facility soils (see the draft Conceptual Site Model). Exposure pathways associated with on-facility soils will be characterized in a separate phase of EPA's investigation which will begin at a later date.

Issue #1: What is the basis for the number of samples to be collected in each yard?

Sampling will be designed to provide representative data for the exposure areas at the site. The exposure areas for this phase of the study are assumed to be the individual residential yards. The relevant statistical parameter for lead risk assessment is the average concentration within the yard. The relevant statistical parameter for arsenic risk assessment is the 95% upper confidence limit on the arithmetic mean concentration within the yard.

The hypothesis selected for the test is:

Null hypothesis: The mean concentration of arsenic or lead within a yard is below a level of concern.

Alternative hypothesis: The mean concentration of arsenic or lead within a yard is above a level of concern.

EPA is relying substantially on the results of the Risk-Based Sampling Study for information about the distribution and variability of metals concentrations within residnetial yards. Using this data and computer simulations, EPA generated probability curves for two locations, one "impacted" property, and one "unimpacted" property.

EPA recommends the following minimum statistical performance parameters for Risk Assessment:

- **80% confidence (20% chance of false positive)**
- **90% power (10% chance of false negative)**

The proability curves will be the focus of the discussion about an appropriate number of samples per yard to achieve the required performance.

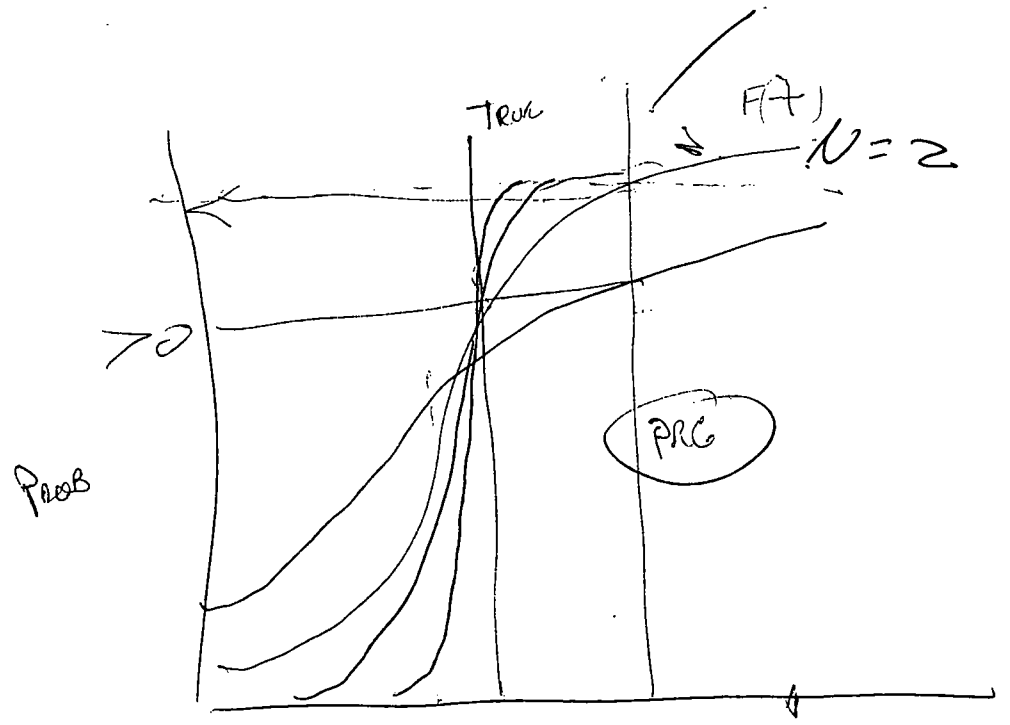
Issue #2: Is subsurface sampling necessary?

Using all data, EPA compared the concentrations of lead, arsenic, cadmium, and zinc in the subsurface to those in the surface at each yard sampled. The purpose of this comparison is to answer the question , " At how many locations is the concentration of arsenic, lead, camium, or zinc higher in the surface than in the subsurface? " The result of this query will be the focus of the discussion on subsurface sampling.

95% confidence (≤ 5% chance of a false negative)

90% power (≤ 20% chance of a false positive, given a specified difference between the true mean and the PRG)

→ e.g., how many samples are needed so that if the true mean is less than the PRG by at least Δ, that there will be no more than a 20% chance the 95% UCL will be above the PRG.



Test:

Calc 95% UCL

If UCL ≤ RBC, Prop is OK

If UCL > RBC, invest further or remediate

$\alpha = 0.05$ ←

$\beta = 0.2$ ←

ie – When I say a property is clean, there will be less than a 5% chance it is really "dirty" ($\alpha = 0.05$)
Also, if I say a property is "dirty" there is less than a 20% chance ($\beta = 0.2$) that the ~~true mean is less than some specified about ("delta")~~ property is really "clean" (Note - here "clean" means that the true mean is less than the PRG by some amount "delta"

Examples

PRG = 1.00

	Two Mean Samp	95% UCL	Decision
→	0.8 → 0.7 (mean)	1.3	Dirty (False pos) – 20%
	0.[illegible]6	0.9 → 0.95	Clean (Correct)
	1.3	1.6 → 2.2	Dirty (Correct)
	1.3	0.6 → 0.9	Clean (False Neg) – 5%